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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,739	09/15/2003	Yugang Ma	450111-04806	1522

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EXAMINER	
TU, JULIA P	
ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/662,739	MA, YUGANG	
	Examiner	Art Unit	
	Julia P. Tu	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09/15/2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The abstract of the disclosure is objected to; the examiner suggests to delete "Figure 3" in the abstract of the disclosure. Correction is required. See MPEP § 608.01(b).

2. The disclosure is objected to because of the following informalities. The examiner suggests to change "(DSP) 20" to "(DSP) 203" to incorporate with the drawings.

Appropriate correction is required.

Claim Objections

3. Claim 10 is objected to because of the following informalities. The examiner suggests to change "an composite signal" in line 3-4, page 4 to "a composite signal". Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 8 recites the limitation "the optimization criterion" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1 rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926).

(1) with regard to claim 1:

As shown in figure 1, Koch discloses a wireless CDMA system in which orthogonal spreading codes are used, a method of reducing multiple access interference caused by a loss of orthogonality between multiple spread spectrum communications signals, the method comprising the steps of:

receiving over a multi-path channel the multiple communications signals (see multiple channels; a, b, 5a, 5b in figure 1);

passing the received signals through a plurality of correlation branches (see 6a and 6b in figure 1) and combining the outputs of the correlator branches to produce a combined signal (see block 12 in figure 1);

passing the combined output signal through an equalizer (see block 3 in figure 1);

Koch discloses all of the above subject matters but does not explicit teach the equalizer is an adaptive equalizer and demodulate the output of the equalizer.

However, in Koch reference, since the individual receive branches a, b are adjusted to the transmission requirements with the aid of the matching circuits at predeterminable time intervals during the equalization (column 3, lines 60 – column 4, lines 2); consequently, it is obvious to one skill in the art that the equalizer is an adaptive equalizer in order to response to the adjusted signals. In addition, demodulate the output of the equalizer is well known in the art as it is evident by MacEachern et al. (see figure 3, blocks 54 (adaptive equalizer) and block 38 (demodulator)). It is obvious to one of ordinary skill in the art to combine the teaching of MacEachern et al. to the teaching of Koch to reduce the effect of jitter as well as to improve the demodulation process.

(2) with regard to claim 7:

In Koch reference, since the individual receive branches a, b are adjusted to the transmission requirements with the aid of the matching circuits at predeterminable time intervals during the equalization (column 3, lines 60 – column 4, lines 2); consequently, it is obvious to one skill in the art that the equalizer is an adaptive equalizer whose length is adaptively adjusted in order to response to the adjusted signals.

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) further in view of Berezdivin et al. (US 6,847,678).

Koch and MacEachern et al. disclose all of the above subject matters including the equalizer using adaptive loop but fail to teach using pilot de-modulation.

However, using pilot de-modulation is well known in the art as it is evident by Berezdivin et al. (column 9, lines 30-33). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Berezdivin to the teaching of Koch and MacEachern in order to allow coherent demodulation as well as to improve power efficiency (column 9, lines 33-34).

10. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and further in view of Crebouw (5,090,028).

Koch, MacEachern, and Sano do not explicitly teach a normalisation process is carried out prior to passing the combined signal through the equalizer. However, normalizing the composite signal before equalizing is well known in the art as it is evident by Crebouw (see figure 1, block 25: normalizing circuit and block 29: equalizer, column 3, lines 10-12). One skill in the art would have combined the teaching of Crebouw to the teaching of Koch, MacEachern, and Sano so that the equalization can be effected under the best possible conditions (column 3, lines 12-13).

11. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and further in view of Crebouw (5,090,028) and further in view of Jeske et al. (US 2002/0176516).

Koch, MacEachern, Sano, and Crebouw do not explicitly teach the normalisation process involves taking an exponential weighted or slide window average of the combined signal.

However, Jeske discloses the normalisation process involves taking an exponential weighted of the combined signal (page 1, paragraph 0016).

One skill in the art would have recognized that the normalisation process involves taking an exponential weighted of the combined signal is well known in the art. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Jeske to the teaching of Koch, MacEachern, Sano, and Crebouw in order to accurately estimate signal-to-interference+noise ratio as well as to improve the performance of communication systems.

12. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and further in view of Lai et al. (US 2006/0126715).

Koch, MacEachern, and Sano disclose all of the subject matters in claim 3 above except for the equaliser applies a recursive least square algorithm.

However, the equaliser applies a recursive least square algorithm is well known in the art as it is evident by Lai (page 3, paragraph [0051]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the equaliser applies a recursive least square algorithm as taught by Lai into the

system as taught by Koch, MacEachern, and Sano in order to make the overall communication operation more efficient.

13. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and Sano (US 6,879,624)

As shown in figure 1, Koch discloses a method of reducing multiple access interference between multiple communications signals, the method including the steps of:

receiving over a multi-path channel the multiple communications signals (see multiple channels; a, b, 5a, 5b in figure 1);

recovering from the received signals a plurality of signals of interest each of which corresponds with a different one of the paths of the multi-path channel see 5a and 5b in figure 1);

estimating a weight for each of the paths of each of the signals (figure 1, column 3, lines 30-35)

combining the recovered signals to produce a combined signal (see block 11, 12 in figure 1); and

passing the combined signal through an equaliser to produce an output (see block 3 in figure 1); and

Koch discloses all of the above subject matters but does not explicit teach demodulating the output of the equalizer.

However, demodulate the output of the equalizer is well known in the art as it is evident by MacEachern et al. (see figure 3, blocks 54 (adaptive equalizer) and block 38 (demodulator)). It is obvious to one of ordinary skill in the art to combine the teaching of MacEachern et al. to the teaching of Koch to reduce the effect of jitter as well as to improve the demodulation process.

Koch and MacEachern disclose all of the subject matters above except for, offsetting each of the signals by an appropriate delay, applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated.

However, Sano discloses estimating a weight for each of the paths of each of the signals (see weight controller 123 in figure 4), offsetting each of the signals by an appropriate delay (see block 122 in figure 4), applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated (see 124-1 to 124-H).

One skill in the art would have known that delaying the signals before combining is obvious because the signals need to be time aligned in order to be combined. In addition, applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated is needed to provide highly accurate path detection corresponding to the signal quality in the path (column 4, lines 1-2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Sano to the teaching of Koch and MacEachern in order to improve the reception quality (column 4, lines 2-3).

(2) with regard to claim 17:

In Koch reference, since the individual receive branches a, b are adjusted to the transmission requirements with the aid of the matching circuits at predeterminable time intervals during the equalization (column 3, lines 60 – column 4, lines 2); consequently, it is obvious to one skill in the art that the equalizer is an adaptive equalizer whose length is adaptively adjusted in order to response to the adjusted signals.

14. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and Sano (US 6,879,624) and further in view of Berezdivin et al. (US 6,847,678).

Koch and MacEachern et al. disclose all of the above subject matters including the equalizer using adaptive loop but fail to teach using pilot de-modulation.

However, using pilot de-modulation is well known in the art as it is evident by Berezdivin et al. (column 9, lines 30-33). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Berezdivin to the teaching of Koch and MacEachern in order to allow coherent demodulation as well as to improve power efficiency (column 9, lines 33-34).

15. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and Sano (US 6,879,624) and further in view of Crebouw (5,090,028).

Eventhough Koch, MacEachern, and Sano do not explicitly teach a normalisation process is carried out prior to passing the combined signal through the equalizer,

normalizing the composite signal before equalizing is well known in the art as it is evident by Crebouw (see figure 1, block 25: normalizing circuit and block 29: equalizer, column 3, lines 10-12). One skill in the art would have combined the teaching of Crebouw to the teaching of Koch, MacEachern, and Sano so that the equalization can be effected under the best possible conditions (column 3, lines 12-13).

16. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and Sano (US 6,879,624) and further in view of Lai et al. (US 2006/0126715).

Koch, MacEachern, and Sano disclose all of the subject matters in claim 3 above except for the equaliser applies a recursive least square algorithm.

However, the equaliser applies a recursive least square algorithm is well known in the art as it is evident by Lai (page 3, paragraph [0051]). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the equaliser applies a recursive least square algorithm as taught by Lai into the system as taught by Koch, MacEachern, and Sano in order to make the overall communication operation more efficient.

17. Claims 10, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926), Sano (US 6,879,624), and Crebouw (5,090,028).

(1) with regard to claim 10:

As shown in figure 1, Koch discloses an apparatus for use in a receiver in a communications system in which system signals are transmitted over multi-path channels, the apparatus including:

means to recover from a signal received over one of said multi-path channels a plurality of signals of interest, each of the recovered signals corresponding to a different one of the paths of the one multi-path channels (5a, 5b, 1a, 1b in figure 1);

means to estimate a weight for each of the paths of each of the recovered signals (figure 1, column 3, lines 30-35);

means to combine the recovered signals to produce an composite signal (block 11, 12 in figure 1);

an equaliser to process the composite signal to produce an equalised signal (block 3 in figure 1); and

Koch discloses all of the above subject matters but does not explicit teach means for demodulating the output of the equalizer.

However, demodulate the output of the equalizer is well known in the art as it is evident by MacEachern et al. (see figure 3, blocks 54 (adaptive equalizer) and block 38 (demodulator)). It is obvious to one of ordinary skill in the art to combine the teaching of MacEachern et al. to the teaching of Koch to reduce the effect of jitter as well as to improve the demodulation process.

Koch and MacEachern disclose all of the subject matters above except for, offsetting each of the signals by an appropriate delay, applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated.

However, Sano (US 6,879,624) discloses estimating a weight for each of the paths of each of the signals (see weight controller 123 in figure 4), offsetting each of the signals by an appropriate delay (see block 122 in figure 4), applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated (see 124-1 to 124-H).

One skill in the art would have known that delaying the signals before combining is obvious because the signals need to be time aligned in order to be combined. In addition, applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated is needed to provide highly accurate path detection corresponding to the signal quality in the path (column 4, lines 1-2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Sano to the teaching of Koch and MacEachern in order to improve the reception quality (column 4, lines 2-3).

Eventhough Koch, MacEachern, and Sano do not explicitly teach means to normalise the composite signal, normalizing the composite signal before equalizing is well known in the art as it is evident by Crebouw (see figure 1, block 25: normalizing circuit and block 29: equalizer, column 3, lines 10-12). One skill in the art would have combined the teaching of Crebouw to the teaching of Koch, MacEachern, and Sano so

that the equalization can be effected under the best possible conditions (column 3, lines 12-13).

(2) with regard to claim 12:

As shown in figure 1, Koch discloses a wireless receiver for use in a communications system in which the receiver receives signals transmitted over multi-path channels, including processing means to:

to recover from a signal received over one of said multi-path channels a plurality of signals of interest, each of the recovered signals corresponding to a different one of the paths of the one multi-path channels (5a, 5b, 1a, 1b in figure 1);

to estimate a weight for each of the paths of each of the recovered signals (figure 1, column 3, lines 30-35);

to combine the recovered signals to produce an composite signal (block 11, 12 in figure 1);

to process the composite signal to produce an equalised signal (block 3 in figure 1); and

Koch discloses all of the above subject matters but does not explicit teach means for demodulating the output of the equalizer.

However, demodulate the output of the equalizer is well known in the art as it is evident by MacEachern et al. (see figure 3, blocks 54 (adaptive equalizer) and block 38 (demodulator)). It is obvious to one of ordinary skill in the art to combine the teaching of

MacEachern et al. to the teaching of Koch to reduce the effect of jitter as well as to improve the demodulation process.

Koch and MacEachern disclose all of the subject matters above except for, offsetting each of the signals by an appropriate delay, applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated.

However, Sano (US 6,879,624) discloses estimating a weight for each of the paths of each of the signals (see weight controller 123 in figure 4), offsetting each of the signals by an appropriate delay (see block 122 in figure 4), applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated (see 124-1 to 124-H).

One skill in the art would have known that delaying the signals before combining is obvious because the signals need to be time aligned in order to be combined. In addition, applying to each of the signals a scale factor which is the conjugate of the corresponding weight estimated is needed to provide highly accurate path detection corresponding to the signal quality in the path (column 4, lines 1-2). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Sano to the teaching of Koch and MacEachern in order to improve the reception quality (column 4, lines 2-3).

Eventhough Koch, MacEachern, and Sano do not explicitly teach means to normalise the composite signal, normalizing the composite signal before equalizing is well known in the art as it is evident by Crebouw (see figure 1, block 25: normalizing

circuit and block 29: equalizer, column 3, lines 10-12). One skill in the art would have combined the teaching of Crebouw to the teaching of Koch, MacEachern, and Sano so that the equalization can be effected under the best possible conditions (column 3, lines 12-13).

18. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koch (5,297,171) in view of MacEachern et al. (5,132,926) and Sano (US 6,879,624) and further in view of Berezdivin et al. (US 6,847,678).

Koch, MacEachern et al., and Sano disclose all of the above subject matters including the equalizer using adaptive loop but fail to teach using pilot de-modulation.

However, using pilot de-modulation is well known in the art as it is evident by Berezdivin et al. (column 9, lines 30-33). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Berezdivin to the teaching of Koch and MacEachern in order to allow coherent demodulation as well as to improve power efficiency (column 9, lines 33-34)

21. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sourour (US 6,865,218) in view of Koch (5,297,171) and MacEachern et al. (5,132,926).

As shown in figure 1, Sourour discloses a mobile terminal for use in a CDMA communications system, the terminal including:

a user interface adapted to allow a user to control the mobile terminal and to input local service signals for transmission and to hear remote service signals recovered from received signals (column 16, lines 8-12);

a transmitter adapted to transmit the local service signals to a base station via a radio frequency transmit signal (column 16, lines 13-14); and

a receiver adapted to recover remote service signals from a received composite signal (column 16, lines 15-16); the receiver including:

a plurality of rake fingers to recover from a signal received over one of said multi-path channels a plurality of signals of interest, each of the recovered signals corresponding to a different one of the paths of the one multi-path channels (column 16, lines 31-40);

means to combine the recovered signals from the rake fingers to produce a combined signal (column 16, lines 48-51);

Sourour disclose all of the above subject matter except for an equaliser to process the combined signal and a demodulator to demodulate the output of the equaliser.

However, Koch teaches an equaliser to process the combined signal ((see block 3 in figure 1).

It is desirable to include an equalizer to process the combined signal to improve the transmission quality. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include an equalizer to process the combined signal as taught by Koch into the system as taught by Sourour in order to improve the transmission quality. In addition, demodulate the output of the equalizer is

well known in the art as it is evident by MacEachern et al. (see figure 3, blocks 54 (adaptive equalizer) and block 38 (demodulator)). It is obvious to one of ordinary skill in the art to combine the teaching of MacEachern et al. to the teaching of Sourour and Koch to reduce the effect of jitter as well as to improve the demodulation process.

22. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sourour (US 6,865,218) in view of Koch (5,297,171) and MacEachern et al. (5,132,926) and further in view of Berezdivin et al. (US 6,847,678).

Sourour, Koch, MacEachern teach all of the subject matters in claim 14 above including the equalizer using adaptive loop (see figure 1 in Kock reference) but fail to teach using pilot de-modulation.

However, using pilot de-modulation is well known in the art as it is evident by Berezdivin et al. (column 9, lines 30-33). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Berezdivin to the teaching of Koch and MacEachern in order to allow coherent demodulation as well as to improve power efficiency (column 9, lines 33-34).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julia P. Tu whose telephone number is 571-270-1087. The examiner can normally be reached on 7:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

J.T.
01-30-2007

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER